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The European Paediatric Cardiac Code Long List: structure and function – the first revision

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The Long List

THE LONG LIST IS A COMPREHENSIVE hierarchical system of coding and classification for the diagnosis and treatment of cardiac disease. The list was first published in 2000, as part of the standard coding system recommended by the Association for European Paediatric Cardiology for use across Europe.[1] It embraces the entirety of the diagnosis and therapy of children with congenital and acquired cardiac disease. The Long List, as a whole, was adopted by the Association in 1998. Its development and expansion has been detailed previously.[2] In essence, it grew from a list of 507 purely diagnostic terms published in 1985,[3] through to a 1,777 item, hierarchical 12 tree structure in the Netherlands by 1988, and then to a single hierarchical structure of over 4,300 items in London by 1994. Although originally aimed at the clinician or surgeon treating cardiac disease first appearing in infancy or childhood, during this time it was enlarged to encompass abnormalities first diagnosed in fetal life, as well as cardiac disease first acquired during adult life. The list published in 2000 was composed of 4,777 items. These were made up of 3,906 individual terms, most of whom were mutually exclusive and unambivalent, given the constraints of clinical ambiguities and differing cultures of practice. There were 571 qualifier terms, which provided additional detail to individual or multiple items, such as the severity of a lesion, the size of an interposition shunt or conduit, or the material used to close a septal defect. A further 300 duplicate diagnostic or procedural terms were then included, as some terms may have relevance in multiple areas. For example, *Hypoplastic left heart syndrome* is found under congenital anomalies of the left ventricle, as well as in the section dealing with the aortic valve. Since that time, the list has been expanded to a total of 6,004 items, consisting of 4,669 individual terms, 906 qualifier terms and 429 duplicate terms. This revised List incorporates changes in clinical practice and classification, deficiencies identified by users and fed back to the Coding Committee of the Association, as well as submitted suggestions for improvement. The major revisions incorporated into the system have been detailed in the accompanying article from the Coding Committee.[4] These are briefly restated in this review, along with additional areas of change which relate specifically to the Long List.

- The Long List has been fully cross mapped to the Short List so that both lists can be utilised within the same database system to meet the various different needs of the institution, as discussed in the preceding accompanying article.[4] The mapped numerical code and term are listed as the last two columns, but only the code from the Short List, without the accompanying term, is shown in the Supplement due to space constraints. The full details are available on the web site of the Association at www.aepc.org/code-com.htm
- The addition of 763 new individual terms to the system. Many are a result of incorporating terms from the International Congenital Heart Surgery Nomenclature and Database Project, terms that were not represented exactly in the previous version of the European Code. There were also many additions to take into account advances in procedural techniques, such as *Arterial and atrial switch procedures (double switch)*, changes in diagnostic nomenclature, such as in the sections concerned with pulmonary vascular disease and arrhythmias, and recognition of the changing needs of individual groups, for example, in the sections involving fetal cardiology and arrhythmias.

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- The section concerning arrhythmias has been completely rewritten to establish both a descriptive and mechanistic structure (Sections 800–893 of the listing).
- New sections include those covering acquired lung and thoracic disease (Sections 730–2 of the listing), including respiratory failure, with corresponding additional detail in sections dealing with lung transplantation (Section 1308) and its complications (Sections 1920–2). Sections covering aortic aneurysm and dissection have also been added (Sections 697, 698 and 1162). There has been considerable expansion in many other areas, from the sections on systemic venous abnormalities (Sections 81–2 and 1017–8), atrial septal defects (Sections 140–2), aorto-pulmonary window (Section 305), and coronary arterial abnormalities (Sections 461–2), to those covering fetal echocardiographic abnormalities (Section 518) and long QT syndrome (Section 861).
- A total of 28 new qualifier sections have been added, giving refined anatomical and surgical details to a greater level than was thought necessary in the first publication of the List. **These are listed in the appendix.** A new qualifier section (Section 952 of the listing) specifically addresses the needs of the clinician working with patients in whom lesions need to be excluded, where previous surgery may have taken place, or where there is diagnostic uncertainty, as well as other generic modifiers. These can be added to any term, for example: – *status: post-procedure* (Q1.90.51), – *resolved* (Q1.90.55), – *no abnormality detected* (Q1.90.56), – *ruled out* (Q1.90.57) or – *diagnosis uncertain* (Q1.90.50).
- The high level generic and "collective" terms previously having the expression *(unspecified)* appended after the term have had this addition deleted. The Short List "collective terms" are now identified in the Long Lists by additional symbols in the first column (c1, c2).
- Also to aid clarity, those items which should not be used in isolation from other terms, such as any of the qualifier terms, have had that section or individual item flagged by the symbol "@" in the first column. This applies to most of the normal terms, since one would not be coding *Right superior caval vein to right atrium* in isolation, but only as part of a description of a pathological lesion, as well as more descriptive lower hierarchical sections, such as that describing *Infundibular morphology* (Section 286 of the listing).
- Having established the Short List as a direct derivative of the Long List, the historical Bypass section, dating back to the Dutch system of the late 1980s and previously Section 2 of the listing, was deemed redundant. To aid the user, the common congenital pathological complexes of tetralogy of Fallot, transposition of the great arteries, and functionally univentricular heart, along with their respective variants, have been highlighted in their own early sections (70, 71 and 72 of the listing, respectively). Section 2 of the listing now consists of a listing of the normal terms, which are widespread throughout the System.
- One of the difficulties for the clinician can be the distinction between whether a lesion is congenital or acquired, particularly with respect to valvar lesions. Although the system is structured so that the natural default is for a lesion to be considered congenital unless otherwise stated, it was felt that, for a few lesions, it was necessary to state this fact, so as to distinguish it from an acquired lesion. As a consequence, a third, generic term was needed, at a higher level for these specific lesions, to cater for the potential uncertainty. For example, aortic valvar stenosis now exists as *Aortic valvar stenosis* (09.15.93), *Aortic valvar stenosis – congenital* (09.15.01) and *Aortic valvar stenosis – acquired* (10.36.02), as well as the other variants: *Rheumatic aortic stenosis* (10.05.12), *Aortic valvar stenosis – recurrent* (10.36.03), *Residual aortic valvar stenosis* (15.35.01) and *Post-procedural aortic valvar stenosis* (15.35.02). The logical progression of this would be additionally to append *congenital* to all the items in the congenital listings (Sections 5-495 of the listing) with this potential, and to have an entire duplicate series of codes and sections at a higher level which could be either congenital or acquired for these lesions. Rather than add this further level of complexity to an already large system, it was judged preferable to single out a few similar problematic lesions to be treated in this way (Section 4 of the listing), and have the option of a generic qualifier for other lesions (Section 952 of the listing).
- The historical nature of the six digit numerical system, going back to the mid 1980s, has resulted in many of the terms becoming obsolete or redundant. An appendix has been added at the end of the Long List detailing these items for those users who have been employing previous versions of the Long List over the years as part of a database system. Inevitably with such a large system, some errors have crept in, such as when an obsolete numerical code was re-deployed inadvertently, and attached to a new and different term. These are also listed so that software solutions can ensure that these items are re-assigned correctly, thus avoiding any loss of details pertaining to historical patients.

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As with the first publication, the System remains hierarchically arranged, with a major division between diagnostic and therapeutic sub-hierarchies, as well as a sub-hierarchy dealing with post-procedural complications and sequels. The normal and generic terms (Sections 2, 3 and 4 of the listing) are given first, with 68 individual terms, 49 of which are duplicated within later sections. There follows seven major diagnostic sub-hierarchies, with 2,432 individual terms, 334 qualifier terms, as well as 193 duplicated items:

- Congenital heart defects in sequential segmental order: 1,096 diagnostic terms, 89 qualifier terms and 93 duplicate items; Sections 5 through 495 of the listing.
- Hereditary, fetal, neonatal and non-cardiac congenital abnormalities associated with heart diseases: 276 diagnostic terms, four qualifier terms and 13 duplicate items; Sections 500 through 585 of the listing.
- Cardiothoracic acquired abnormalities and diseases: 715 diagnostic terms, 27 qualifier terms and 67 duplicate items (53 of whom were from the Post-operative complication sub-hierarchy); Sections 600 through 732 of the listing.
- Functional and Pre-procedural Status: 23 terms and four duplicate items; Sections 740 through 742 of the listing.
- Signs, symptoms and investigations: 105 terms and seven duplicate items; Sections 750 through 790 of the listing.
- Disturbances of rhythm and conduction: 217 diagnostic terms, 46 qualifier terms and nine duplicate items; Sections 800 through 893 of the listing.
- Diagnostic qualifier terms: 168 items; Sections 950 through 982 of the listing.

There are five therapeutic sub-hierarchies, with 1,518 individual procedural terms, 433 qualifier terms, as well as 172 duplicate items:

- Cardiac operations and interventions: 1,208 individual procedure terms, 166 qualifier terms and 167 duplicated items (114 of whom are transcatheter interventional procedure terms); Sections 1000 through 1321 of the listing.
- Post-operative and cardiac support procedures and therapies: 78 procedure terms, seven qualifier terms and one duplicate item; Sections 1330 through 1345 of the listing.
- Thoracic, pleural, tracheal, bronchial and lung procedures: 103 procedure terms and 16 qualifier terms; Sections 1350 through 1380 of the listing.
- Transluminal interventional catheter procedures and techniques: 129 procedure terms and four duplicate items; Sections 1400 through 1460 of the listing.
- Surgical qualifier terms (materials and sizes): 244 items; Sections 1600 through 1680 of the listing.

The final sub-hierarchy consists of post-procedural complications and sequels: 651 terms, 139 qualifier terms and 64 duplicate items (49 of whom were from the Acquired heart disease sub-hierarchy); Sections 1800 through 1922 of the listing.

Terminology and nomenclature

The terminology and structure of the listings of the congenital cardiac malformations in particular remains based on the segmental approach, as proposed by Van Praagh (1972),[5] and elaborated by Anderson and colleagues in the 1970s and 1980s to include detailed analysis of the atrioventricular and ventriculo-arterial junctions.[6–8] The system is dependent only on observed and observable anatomic data, excluding speculative embryological and morphogenetic considerations. The approach involves describing systematically, in mutually exclusive terms, all morphologies, connections, and relations of the cardiac chambers and vessels. Wherever possible, a similar approach has then been used for the other hierarchies. Consistent with this, the nomenclature used throughout the listing is primarily descriptive, with each word adding detail and clarity to the term. Thus, each term used has been carefully examined to ensure descriptive accuracy and, wherever possible, a correct use of English, given the constraints of space and attempts to use a lead word which enables finding an item when searching alphabetically or morphologically. For example, *Discordant atrioventricular connections (biventricular)* is a plural term, as there are two connections within the atrioventricular junctions, one between each atrium and each ventricle, whilst *Double inlet atrioventricular connection (univentricular)* is singular, as there is only the one such connection. Equally, "Atrioventricular discordance" is not used. This is because the correct adjectival term is "discordant" with respect to the atrioventricular connection. "Atrioventricular discordance" itself was first introduced to describe harmony between the atrial and ventricular segments, rather than the way in which the two segments were joined together.[6]

Eponyms have been avoided wherever possible, or else included in parentheses, such as *Filigreed network of venous valves (Chiari)*. In this way, the need for explanatory definitions has been minimised. Certain eponyms are so well established, however, and the lesions or procedures they cover so relatively complex that they have been retained. The most obvious of these are *Tetralogy of Fallot,* and *Ebstein's malformation of tricuspid valve,* in the diagnostic hierarchy along with various surgical procedures such as those associated with Fontan,

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Senning, Blalock and Norwood. The use of Latinisms has been minimised, retaining the occasional established term in parentheses, for example *ASD within oval fossa (secundum)* and *Patent arterial duct (PDA)*. Alphanumerical classification of lesions, such as those proposed by Van Praagh and colleagues[9] for functionally univentricular hearts, and Rao[10] for tricuspid atresia, have also been avoided completely in most areas, with preference given to a fully descriptive approach to the lesion. Occasionally, such a classification has been added in parentheses where well established finite classifications exist, for instance *Interrupted aortic arch distal to left subclavian artery (type A)* and *Atrioventricular septal defect: ventricular component under Superior Bridging Leaflet: SBL split at crest ventricular septum (Rastelli A)*. Again, this obviates the need for long definitions and tables to understand the morphology of the lesion, particularly with respect to rare but important variants.

The exception to this has been the use of the Leiden convention[11] for describing the variants of coronary arterial origin in the setting of abnormal ventriculoarterial connections (Section 462 of the listing). In this case, it is known that, almost without exception, the arteries originate in relation to one or other, or usually both, of the aortic sinuses which are adjacent to the pulmonary trunk. These sinuses can always be differentiated, irrespective of the relationships of the arterial trunks themselves, according to their position as viewed by the observer placed, figuratively speaking, in the non-adjacent sinus of the aorta. Then one sinus is always to the right hand of the observer, whilst the other sinus is to the left hand. These sinuses are not always right-sided or left-sided, nor do they necessarily give rise to the right or left coronary arteries, respectively, but they can always be differentiated as being to the right or left hand. When first described, this convention was expressed using numerical symbols. Thus, the sinus to the right hand is known as "Sinus #1", whilst that to the right hand is "Sinus #2". This numerical convention does have advantages, since it removes difficulties with spatial recognition. It is very unusual to find coronary arteries which do not arise from one or other of the two adjacent aortic sinuses.

Format and usage of the Long List

The Long List itself is arranged in eight columns, with two additional columns in the current listing that show the appropriate Short List code and term. The initial column contains the section number. This is accessed by the system in an hierarchical manner, and is referred to in column three, the "**go to**" column. This latter column directs the user onto the next related or qualifier section as appropriate, or back to the top of the relevant major sub-hierarchy. It is assumed, for the most part, that the System will be computer driven, and that this column will be "looked at" and travelled to automatically in a seamless manner. The overall division of the sections with respect to the various major sub-hierarchies is detailed above. In addition, this revised version of the Long List has two additional items in the first column which act as flags. A "c1", "c2" or "c3" denotes when an item is a "collective" term of declining hierarchical levels with respect to the Short List, as discussed in the preceding article.[4] The symbol "@" denotes when a term or section should only be used as part of a description of a pathological lesion (for example, terms within a qualifier section), in other words, the item should not be used in isolation.

Adjacent to the section number in the next column is the section title. This should not appear when visualising the list of desired terms, but is present to aid the user when visually travelling through the sections to find the correct codes. Subsequent to the title in each section in the same column are the descriptive terms themselves. Thus, column two contains the term itself, as well as the higher order text from which the hierarchy is structured. This results in three different formats of text in this and the adjacent two columns (columns three and four):

1. **The section or sub-hierarchy title.** This is described above. The remaining columns along that row are empty.
2. **The complete term with code.** The term itself ends with a comma to indicate that it is a complete term. The **go to** number in the third column after each term indicates the section to which one should next proceed, or to which one is taken by the computer software as part of the hierarchy. This next section may either be a related section, a qualifier section or, more commonly, it is the master section for that part of the coding system (for example, to Section 5 for congenital heart defects or to Section 1000 for the procedure terms). In other words, that particular term with its six digit code is complete. There follows, therefore, in the fourth column, the matching European Paediatric Cardiac six digit code (see Example 1 from Section 15 in Appendix 2).
3. **Text which leads to another section.** Here there is no comma at the end of the text, nor a code to follow. In the fourth column (instead of the six digit code), there reads: *not relevant*, as there is no indication to have a code here. The next section to which this leads may have any of these three formats. This is demonstrated in Example 2 (Appendix 2) from Section 10 of the listing. This

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is an index section consisting of a series of further sections to go on to as the hierarchical tree is descended.

The previous historical use in the Long List of Incomplete Terms which were completed by going on to the next section, has been abandoned as an unnecessary complexity. This phenomenon also dated back to the Dutch system of the late 1980s.

The fourth column lists the European Paediatric Cardiac six digit code. Although efforts have been made to keep each section and sub-hierarchy as numerically and sequentially homogeneous as possible, the historical nature of the codes has limited achievement of this ideal. Homogeneity has been possible with the first two digits of the code: 01.xx.xx through 09.xx.xx for congenital heart lesions; 10.xx.xx for acquired heart disease; 11.xx.xx for rhythm disorders; 12.xx.xx for procedures and interventions; 14.xx.xx for hereditary and genetic disorders; 15.xx.xx for post-procedural complications and sequelae; and 16.xx.xx for acquired lung and thoracic disease.

Qualifier terms and codes

As stated above, these 906 modifying items give additional detail to individual or multiple items and more than one can be attached to an individual term. They have either a Q1.xx.xx (diagnostic or complication qualifier) or Q5.xx.xx (procedural qualifier) format. They are divided broadly into those adding diagnostic information, such as which leaflet of the tricuspid valve is involved in an abnormality (Section 163 of the listing), the severity of aortic regurgitation (Section 963) or quantification of pulmonary hypertension (Section 685); and those adding surgical information, such as the size of an interposition shunt, conduit or device (Section 1665); or the type of patch used during a surgical procedure (Section 1610). Each item ends with a comma. Hence, they are complete terms, but can only be used as an optional addition to a standard term for further clarification, as highlighted by the symbol "@" in column 1 next to the Qualifier Section number. In other words, the software running the System must disallow Qx.xx.xx codes being used as stand-alone terms. For example, as illustrated in Example 3 (Appendix 2), once an item in Section 161, detailing abnormalities of the tricuspid valvar leaflets, has been chosen, the "go to" column takes the user to Section 163, where the term may be qualified to state which valvar leaflet is involved in the abnormality. The final text of an item could then read:

Tricuspid leaflet abnormality, – septal leaflet,

At the end of each Qualifier section is an *unknown* category, as it is not necessary to add a qualifier term, despite being taken to the qualifier section by the "go to" column. A qualifier term may, therefore, be attached to a number of different standard terms. Equally, a standard term may have several qualifier terms appended to it. A striking example of this is in the area of coronary artery bypass surgery, where the lead code in Section 1273 may be qualified by up to four qualifiers, as illustrated in Example 4 (Appendix 2), using the initial part of each of Section 1273, 1274, 1275, 1276 and 1635. A final term might therefore read:

Coronary arterial bypass graft × 1, left coronary artery, – proximal third, CABG by end-to-side × 2 anastomoses, Arterial autograft CABG conduit,

There are also sections dedicated to general or generic qualifiers such as the severity or size of any lesion (Section 951) or the patients operative status or results of investigations (see above, Section 952). It should be possible to access these items for use with any term by going to the major diagnostic and surgical qualifier sections from the "table of contents" in Sections 1 and 1000, irrespective of other qualifiers that may be attached. To aid this process, it would be helpful to incorporate a Function Key into the software package used to run the System.

"Unspecified" and "describe" terms

In previous versions of the Long List, the majority of sections had a first term that was used to cover a lesion or procedure in the most generic form for that section, and this was characterised by *"(unspecified)"* being attached to the term. The following terms would then give more detail pertaining to that section. The coding committee of the Association for European Paediatric Cardiology judged that the generic term on its own was self explanatory without the need for this or other clarifying nomenclature, such as "not otherwise specified", being affixed. Such higher level relatively generic terms are often the same ones identified as "collective terms" for the purposes of the Short List, as discussed in the preceding article.[4]

There then follows, at the end of the section, the same generic term, but affixed to this is *"(DESCRIBE)"*. This is to allow a free text description of any diagnosis or procedure which should be in the particular section but has not been detailed. For instance, in Section 1025 (Example 5, Appendix 2), any other form of atrial inversion surgery other than a Senning or Mustard procedure, may be described in free text attached to code 12.29.07. It can be argued that all terms should have a free text option, and this could easily be incorporated into the software, accessible, for instance through a separate Function Key. In this case, one could potentially abandon the latter code

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and use the free text option attached to the generic term for that section. For research purposes however, there remains a distinction between not specifying or knowing the exact type of procedure performed (for example) and not having a code which exactly describes that which was undertaken. Furthermore, it would be difficult to delete these codes from the system due to the large number of patients already on database systems which may have used such *(DESCRIBE)* codes.

Crossmap of the Long List to the International Classification of Diseases

The next four columns are devoted to the diagnostic crossmapping of the terms with European Paediatric Cardiac codes to the ninth and tenth revisions of the International Classification of Diseases ("ICD-9", fifth and sixth columns and "ICD-10", seventh and eighth columns, respectively). Details of how the crossmapping has been achieved has been previously published,[3] and are given in the first part of this supplement. The first column for each revision is the lead code for a particular term, whilst the following one is a supplementary code, which strictly speaking is an optional code, but it usually adds important detail to the main code. When there is an attached "†" to the code and a "*" to the supplementary code, these are compulsory "Dagger and asterisk" codes, both of which need to be present to accord with the rules of the International Classification. Where a "#" has been used, the item concerned has no specific cross match, as the preceding attached term with code covers this additional term. Examples of this include the majority of diagnostic qualifier codes. Where a "nc" has been used, there is no crossmap possible for the term in question, either because the term is a normal one (for instance, *Normal heart* in Section 2, 01.01.00), the term is physiological (for example, the various terms for a reduction in size of ventricular septal defects – Section 291 of the listing) or where the morphological concept is not covered by the International Classification, as with ventricular topology (Section 61). Self-evidently, there are no codes for the Procedure Sections, as the Classification does not cover procedures or interventions, with rare exceptions. Columns four through eight in these therapeutic sub-hierarchies have, therefore, been left blank.

Crossmap of the Long List to the Short List

The final two columns are devoted to the appropriate Short List six digit code (ninth column) and its term (tenth column). Each term with code in the Long List was assessed with respect to the Short List derived items to determine an optimal map. Usually the map would simply be the higher level generic or "collective" item from that section or series of sections. Occasionally a much higher level map was necessary as the Short List would only have a few codes dealing with an area of the Long List with large sections of detail. For example, the two mapped terms for the 72 terms in Sections 530–570 of the listing, covering hereditary and syndromic conditions associated with heart disease are: *Hereditary disorder associated with heart disease* (10.23.04) or *Syndrome/association with cardiac involvement* (14.02.00). Evidently, no crossmap was appropriate for the 906 qualifier terms (with two exceptions:[4] – *status: post-procedure* and *diagnosis uncertain*) or the many terms linked to other more dominant codes, such as the 21 terms in Sections 90–93 dealing with the exact location of anomalous pulmonary venous connections. In a few areas it was not appropriate to have a Short List map, such as describing a patient's functional or neonatal status (Sections 742 and 517), for the majority of normal codes (Section 2) or for the details of the surgical approach (Sections 1003–1011) and in these cases *no equivalent* was entered in the ninth column. Finally, there were rare occasions when the lesion or procedure was so unusual that a specific Short List map was not judged appropriate, given also the need to keep the List reasonably short, such as *Outflow tract from solitary indeterminate ventricle abnormality* (07.08.20). In such cases the term *Cardiac abnormality (DESCRIBE)* (01.01.39) was used as the map.

Clinical usage

As was the case with the Long List previously, an extremely sophisticated System can be developed by the use of appropriate software. It is important to ensure, nonetheless, that the development of a plethora of extra features does not cause the System to become unduly slow, or so complicated that only a few dedicated users feel motivated to use it. It remains the case that it is envisaged that the Short List will be used as an initial layer of terms, enabling all diagnoses and procedures to be coded, as well as allowing full linkage to the underlying comprehensive Long List. This process is now further facilitated by the Long to Short List mapping. An abbreviated institutional, or speciality produced, Short List could also easily be developed from the two lists, ensuring the System was optimally helpful to the particular clinician or department, as it would contain individually tailored datasets for acquisition of patient-specific data and outcomes. The Long List must be enabled by appropriate database software to be both user friendly and embedded with methodology that promotes efficiency and saves time for the lead clinician, junior clinical staff, coding officers and secretarial staff. To achieve this, it is envisaged that the numerical codes themselves will usually be invisible to the user, who will employ "key word" searching as the optimal tool to access the appropriate section into which apposite and accurate data will be entered

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to form the dataset. The key words, with attached numerical codes, lend themselves to sophisticated searching, even for the most complex lesions. Data acquired can then be downloaded for statistical analyses, for returns to central government or health authorities, and to produce word processed reports and summaries for primary care practitioners and other relevant health care professionals. It must be emphasised that the output from the System can only be as reliable as the data entered, both in terms of ensuring that all relevant patient details are entered into the dataset, and also ensuring that the data entered is diagnostically and surgically valid and accurate. It remains a truism that the best systems are those where an individual clinician enters all of the data personally. It will be incumbent on the individual unit to appoint a team leader for acquisition and maintenance of datasets. The unit must also provide the time and manpower resources, as well as the computer systems, so as to ensure the System is able to maximise its full potential for clinical use, thus enhancing optimal care of patients.

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Appendix 1

List of the 28 new qualifier sections in the Long List of the European Paediatric Cardiac Code

Specific pulmonary vein(s) involved in abnormality/procedure	Section 94
ASD within oval fossa (secundum): margins for device closure	Section 142
Characteristics of anterosuperior leaflet in Ebstein's malformation	Section 168
Coronary arterial origin from sinus or commissure	Section 468
Major systemic-to-pulmonary collateral arteries (MAPCAs) characteristics	Section 487
Causes of acquired valvar regurgitation	Section 649
Tumours with cardiac secondary metastatic spread	Section 723
Anatomical location of arrhythmogenic focus	Section 880
Anatomical location of accessory pathways	Section 881
Non-specific generic, status and investigation qualifiers	Section 952
Valvar Z scores	Section 955
Cause & type of vessel stenosis/obstruction	Section 958
Size/function of septal defects/patent arterial duct	Section 964
Characteristics and severity of aortic dilation, aneurysms & dissection	Section 976
Site of cardiac lesion, injury, tumour or procedure	Section 982
Type of VSD involved in procedure	Section 1101
Aortic sinus involved in procedure	Section 1146
Techniques for aortic aneurysm and dissection repair	Section 1175
Techniques for direct ventricle to pulmonary arterial anastomosis procedures	Section 1227
Specifics of lung transplant procedure	Section 1307
Tumour resection qualifiers	Section 1321
Reason for pleural drainage procedure	Section 1337
Pleural procedure qualifiers	Section 1362
Direct suture procedure qualifiers	Section 1601
Procedures for ligation, division and closure of vessels	Section 1602
Pulmonary artery or vein involved in procedure	Section 1680
Causes of lung transplant graft failure	Section 1921
Post-lung transplant anastomotic complication	Section 1922

Appendix 2

Example 1

15	**Position – Orientation of heart in thorax**		
	Normal position/orientation of heart,	to 5	02.01.00
	Position–orientation of heart abnormal,	to 5	02.01.09

Example 2

10	**Arrangement of heart & organs, connections, topology**		
	Position/Orientation of heart in thorax	to 15	not relevant
	Position & morphology of thoraco-abdominal organs	to 20	not relevant
	Atrial arrangement (situs), AV & VA connections	to 30	not relevant
	Cardiac & great vessel topology and relationships	to 60	not relevant
	Ventricular imbalance	to 73	not relevant

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Example 3

161 Tricuspid leaflet abnormalities		
Tricuspid leaflet abnormality,	to 163	06.01.31
Tricuspid valvar prolapse,	to 163	06.01.35

163 Specific tricuspid leaflet involved in abnormality – qualifiers		
– septal leaflet,	to 5	Q1.01.71
– anterosuperior leaflet,	to 5	Q1.01.72
– inferior/mural leaflet,	to 5	Q1.01.73
unknown	to 5	not relevant

Example 4

1273 Coronary arterial bypass grafting (CABG) procedures		
Coronary arterial bypass graft (CABG) procedure,	to 1274	12.23.08
Coronary arterial bypass graft × 1,	to 1274	12.23.51

1274 Target coronary artery at procedure – qualifiers		
unknown	to 1276	not relevant
Left coronary artery,	to 1275	Q5.23.61

1275 Part of target coronary artery involved in CABG procedure – qualifiers		
unknown	to 1276	not relevant
– proximal third,	to 1276	Q5.24.51

1276 Coronary arterial bypass graft conduit route & anastomosis type – qualifiers		
unknown	to 1000	not relevant
CABG by end-to-side × 2 anastomoses,	to 1635	Q5.23.91

1635 Conduits used in coronary artery bypass graft (CABG) procedure – qualifiers		
unknown/unspecified	to 1000	not relevant
Arterial autograft CABG conduit,	to 1000	Q5.99.01

Example 5

1025 Atrial inversion procedures		
Atrial inversion procedure,	to 1000	12.29.06
Senning procedure (atrial inversion),	to 1000	12.29.01
Mustard procedure (atrial inversion),	to 1610	12.29.02
Atrial inversion procedure (DESCRIBE),	to 1000	12.29.07

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